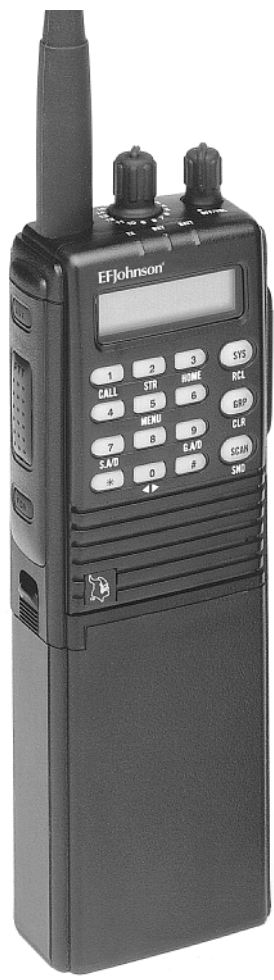# LTR-Net™ 8170 Series

## OPERATING MANUAL

### Trunked Portable Radio



**EFJohnson®**

# SAFETY INFORMATION

The FCC has adopted a safety standard for human exposure to RF energy. Proper operation of this radio under normal conditions results in user exposure to RF energy below the Occupational Safety and Health Act and Federal Communication Commission limits.

## *WARNING*

DO NOT allow the antenna to touch or to come in very close proximity with the eyes, face, or any exposed body parts while the radio is transmitting.

DO NOT operate the radio in explosive or flammable atmospheres. The transmitted radio energy could trigger blasting caps or cause an explosion.

DO NOT operate the radio without the proper antenna installed.

DO NOT allow children to operate or play with this transceiver.

*NOTE: The above warning list is not intended to include all hazards that may be encountered when using this radio.*

This device complies with Part 15 of the FCC rules. Operation is subject to the condition that this device does not cause harmful interference. In addition, changes or modifications to this equipment not expressly approved by the E.F. Johnson Company could void the user's authority to operate this equipment (FCC rules, 47CFR Part 15.19).

**LAND MOBILE PRODUCT WARRANTY -** The manufacturer's warranty statement for this product is available from your product supplier or from EFJohnson, 299 Johnson Avenue, Box 1249, Waseca, MN 56093-0514. Phone (507) 835-6222.

# IMPORTANT OPERATING INFORMATION

**FCC Approval -** This device complies with Part 15 of the FCC rules. Operation is subject to the condition that this device does not cause harmful interference. In addition, changes or modifications to this equipment not expressly approved by E.F. Johnson Company could void the user's authority to operate this equipment (FCC rules, 47CFR Part 15.19).

**Exposure To Radio Frequency (RF) Energy -** This transceiver complies with standards set by OSHA and the FCC for safe human exposure to RF energy. Your exposure can be further reduced by limiting the length and number of calls you make.

**Vehicle Operation While Using Transceiver -** Observe all local regulations regarding the use of radio equipment while operating a vehicle. To safely operate the transceiver in some driving conditions, it may be necessary to pull off the road and park.

**Antenna Care -** Do not operate this transceiver with a broken or damaged antenna. A minor skin burn may result if you touch a damaged antenna. Replace the antenna only with the correct EFJohnson replacement. Using other antennas or attaching equipment to the antenna jack may damage the transceiver and cause operation that violates FCC regulations.

**Interference With Other Electronic Devices -** Most electronic devices are shielded to prevent interference from RF transmitters. However, some devices may be affected, especially when the RF equipment is in close proximity. Therefore, do not use this transceiver where signs prohibit the use of radio equipment, and always request permission before using it near medical devices or equipment. Some automotive automatic braking systems (ABS) may also be affected by RF energy. If you have one of these systems, contact your vehicle dealer to make sure that it will not be affected by radio equipment.

**Interference With Aircraft -** Make sure that this transceiver is turned off before entering any aircraft. Federal Aviation Administration (FAA) regulations require that you do not use radio equipment while the aircraft is in the air and that you obtain crew permission before using it on the ground.

**Children -** Do not let children play with this transceiver. They could injure themselves (by poking themselves in the eye with the antenna, for example). In addition, they could damage the transceiver or make calls that increase your bill.

**Usage in Blasting Areas -** To avoid interference with blasting operations, be sure to turn the transceiver off in areas posted "Blasting Area" or "Turn Off Two-Way Radio". Remote controlled RF devices are sometimes used to set off explosives.

**Operation in Explosive Atmospheres -** Turn the transceiver off when in an area with a potentially explosive atmosphere. Although rare, the transceiver could generate a spark or a hot surface that could cause an explosion or fire resulting in bodily injury or even death.

**Operation in Flammable Atmospheres -** Areas with potentially flammable atmospheres are usually, but not always, clearly posted. These areas may include fueling areas such as gas stations, fuel or chemical storage and transfer stations, below deck on boats, and areas where the air contains flammable chemicals or particles such as grain dust or metal powders. Do not use or transport the transceiver in any atmosphere or compartment potentially containing flammable gas, liquids, or explosives.

# NOTES

# TABLE OF CONTENTS

# QUICK REFERENCE GUIDE



Monitor Mode · Call Indicator · Aux Call Group · Phone Group Selected · Phone Mode Selected · System Scan List Indicator · Low Power · Scan Mode · Quick Select Sw Locked · Group Scan List Indicator

S ◄ L C ⚡ U 📞 G

Alphanumeric Display

## STANDARD MODELS

**Change system/group number -** Turn quick select switch to the desired position.

**System scan on/off -** FCN (lower sw. on side) SCAN

**Monitor conv. channel before transmitting -** AUX (upper sw. on side)

**Change scan list status of displayed system -** FCN A/D. If "S" is displayed, the system is in the scan list and scanned normally. To add all deleted systems back into the scan list, hold A/D for at least 2 sec.

**Change display mode -** ◄ ►

## TELEPHONE KEYPAD MODELS

**Change system number -** Turn quick select switch to the desired position. Alternatively, press SYS to increase or FCN SYS to decrease the system number. Holding the key down causes the function to repeat.

**Change group number -** Same as above except press GRP key.

**Program quick select sw -** Turn the switch to position to be programmed. Select system/group for that position using SYS and GRP keys then press FCN (lower sw. on side) STR. If "LOCKED" is displayed or the system/group cannot be selected, the position is not programmable.

**System scan on/off -** SCAN

**Monitor conv. channel before transmitting -** AUX (upper sw. on side)

**Display home or last active sys/grp -** FCN HOME

**Change scan list status of displayed system -** FCN S.A/D. If "S" is displayed, the system is in the scan list and scanned normally. To add all deleted systems back into the scan list, hold S.A/D for at least 2 sec.

**Change display mode -** FCN ◄ ►

## TELEPHONE CALLING (KEYPAD MODELS)

**Select phone mode (w/o changing sys/grp) -** FCN PHON
**Select phone mode (and phone sys/grp) -** FCN SND
**Transmit no. in display -** Briefly press PTT to acquire dial tone then SND.
**Store a number in memory -** Enter number, then FCN STR (1-6).
**Recall number from memory -** RCL (1-6)
**Erase last no. in display -** CLR
**Erase entire no. in display -** RCL CLR
**Display overflow digits -** RCL ◀ ▶
**Step through numbers in memory -** RCL twice
**Exit phone mode and end call -** FCN PHON
**Terminate the call -** Press # (or ✳ # in some applications)

## MENU MODE (ALL MODELS)

**Select Menu Mode -** FCN MENU then ◀ ▶ to select the desired group, PTT switch to select desired parameter, and FCN to exit.
**Select high or low power -** Select menu mode then HIPOWER or LOPOWER (see "Select Menu Mode").
**Enable/disable keypad -** Select menu mode then KP_LOCK or KP_ENAB (see "Select Menu Mode").
**Enable/disable key press tone -** Select menu mode then KP_MUTE or KP_ENAB (see "Select Menu Mode").
**Select standard, loud, or no proceed tone -** Select menu mode then PTT_1TN (standard), PTT_2TN (loud), or PTT_0TN (none). See "Select Menu Mode".

# FEATURES

- Up to 14 systems programmable for LTR-Net™, LTR®, and conventional operation. Up to 10 groups programmable per system.

- Up to 16 system/group combinations selectable by top panel quick select switch (all models).

- Up to 14 systems, with up to 10 groups each, selectable by front panel SYS and GRP keys (telephone keypad models).

- Liquid crystal display with backlight to indicate system/group, operating mode, and other information.

- System scan and user programmable scan list (LTR and conventional systems).

- Group scan (LTR-Net and LTR systems) with user-programmable group scan list (keypad models).

- Menu mode to select various features.

- Selectable numeric and system alpha tag display modes.

- Selectable high and low power.

- With telephone keypad models, the phone mode can be selected for convenient telephone number dialing and up to six 14-digit telephone numbers can be stored in memory and later recalled.

- Transmit, Busy, and low Battery indicators

- Proceed tone to signal when speaking can begin.

- Time-out timer

- On the side, AUX switch selects conventional channel monitoring, and FCN switch selects alternate function of front panel keys.

*NOTE: Programming by your system operator determines the availability and specific operation of some of the preceding features.*

# CONTROLS AND DISPLAY

Antenna Jack      Quick Select Switch      On-Off/Volume

TX     BSY     BATT

Transmit Indicator     Busy Indicator     Low Battery Indicator
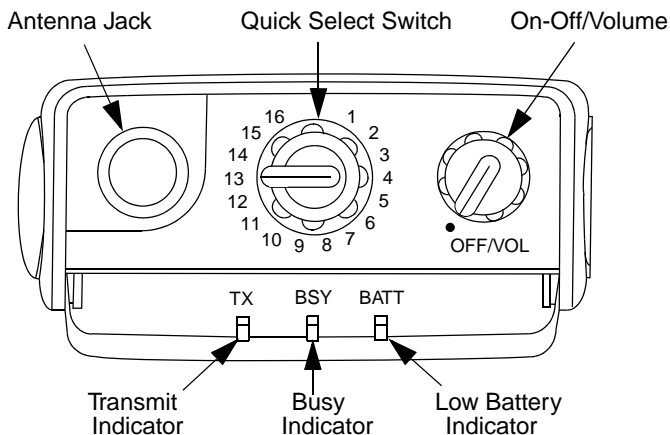
**Top Panel Controls**

**On-Off Volume -** Turning this knob clockwise turns power on and sets the volume level. Turning it counterclockwise to the detent turns power off. Power is on when information appears in the display. Refer to "Setting Squelch and Volume Levels" on page 20 for more information.

**Quick Select Switch -** Selects up to 16 preprogrammed system/ groups. Refer to description on page 35 for more information.

**Antenna Jack -** Connection point for the antenna.

**Top Panel Indicators**

**Transmit Indicator (Red) -** Lights when the transmitter is keyed.

**Busy Indicator (Green) -** Lights when a carrier is detected on a conventional group (channel).

**Low-Battery Indicator (Amber) -** Lights when a low-battery condition exists (see page 30).

## Side Controls
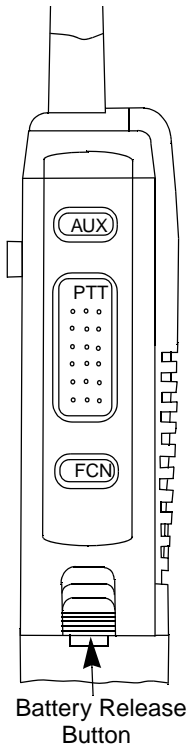
**AUX (Auxiliary) -** Toggles monitor mode on and off and temporarily halts scanning. Pressing this switch twice turns group scanning on and off.

**PTT (Push-To-Talk) -** Keys the transmitter so that a message can be transmitted. The red indicator on the top panel lights when the transmitter is keyed.

**FCN (Function) -** Enables the alternate function of dual-function keys on the front panel for 3 seconds.

**Battery Release Button -** Pushing this spring-loaded button upward releases the battery so that it can slide sideways and be removed for recharging or replacement.

*NOTE: Be sure to turn power off before removing the battery. Failure to do so may prevent current switch settings from being saved in memory.*

Battery Release
Button

**Accessory Connector (not shown) -** This connector is on the opposite side of the transceiver, and it is used for connecting optional accessories such as a speaker-microphone.
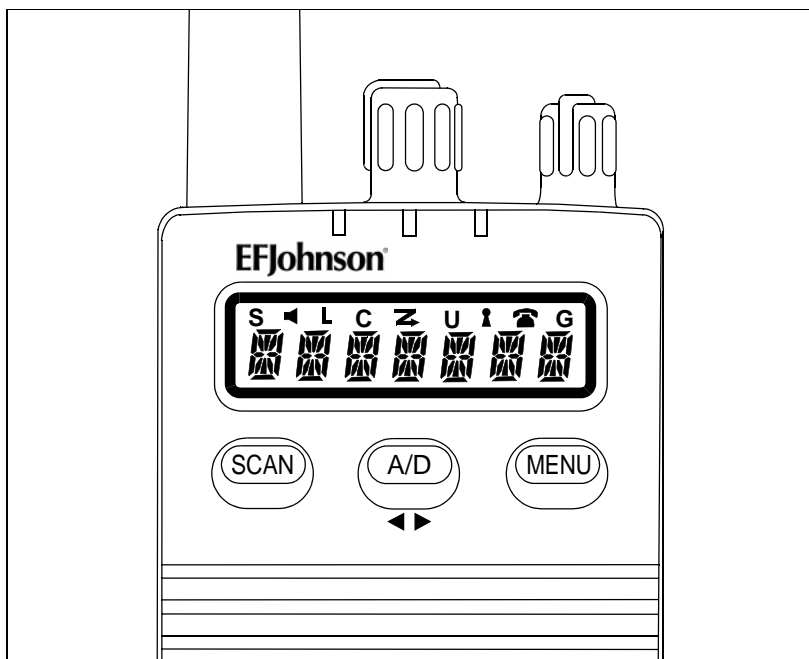
## Front Panel Keys (Std. Models Without Telephone Keypad)

**SCAN -** Pressing FCN on the side and then this key turns the system scan feature on and off. System scanning is enabled when ⚡ is displayed (all systems) and actually occurring when "IN SCAN" is displayed (LTR and conventional systems only).

**A/D ( ◄ ► ) -** Pressing FCN and then this key changes the scan list status of the currently selected system (see "Scan List Program-ming" on page 39). Pressing this key without first pressing FCN toggles the display mode (see page 19).

**MENU -** Pressing FCN and then this key selects the menu mode which selects power output, keypad lock, key press tone disable, and proceed tone loudness (see "Menu Mode" on page 30).
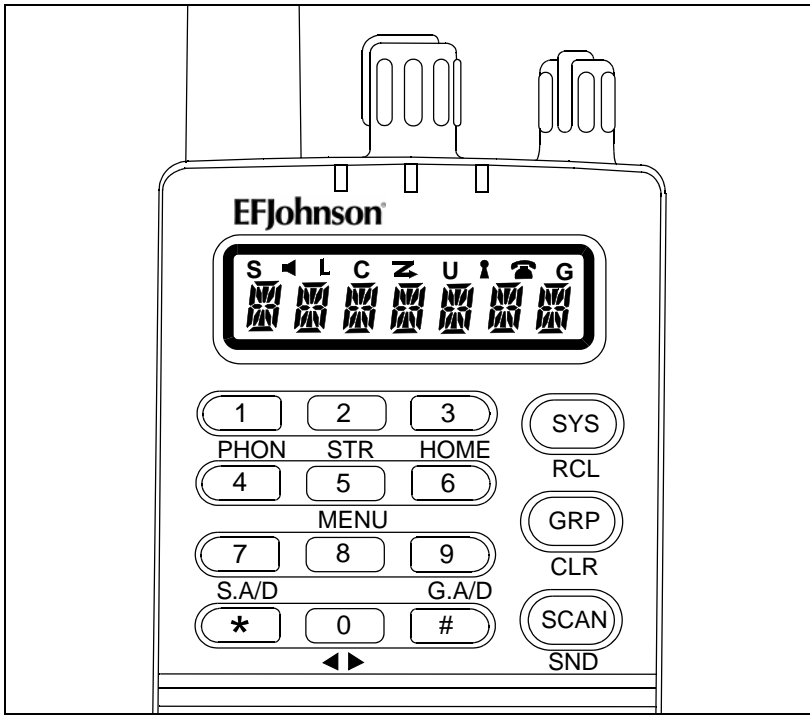
## Front Panel Keys (Models With Telephone Keypad)

**SYS (RCL) -** Increases the selected system number. Pressing FCN on the side and then this key decreases the system number. Holding the key down causes the function to repeat. In the phone mode, pressing this key and then 1-6 recalls the telephone number stored in that location. Pressing it twice starts scrolling through the numbers stored in memory (see "Phone Mode" on page 31).

**GRP (CLR) -** Functions like the SYS key to change the selected group. In the phone mode, pressing this key erases the last number in the display.

**SCAN (SND) -** Turns the system scan feature on and off. System scanning is enabled when ⚡ is displayed (all systems) and is actually occurring when "IN SCAN" is displayed (LTR and conventional

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systems only). Pressing FCN and then this key selects the phone mode and the preprogrammed telephone system/group. In the phone mode, pressing this key with a dial tone sounding sends the number in the display (see "Phone Mode" on page 31).

**1 (PHON) -** Dials a "1" when entering a telephone number. Pressing FCN and then this key selects the phone mode without changing the selected system/group.

**2 (STR) -** Dials a "2" when entering a telephone number. Pressing FCN and then this key programs the quick select position with the selected system/group. In the phone mode, pressing FCN, this key, and then 1-6 stores the current telephone number in that location.

**3 (HOME) -** Dials a "3" when entering a telephone number. Pressing FCN and then this key selects either the Home or Last Active system/group (see page 29).

**4 -** Dials a "4" when entering a telephone number.

**5 (MENU) -** Dials a "5" when entering a telephone number. Pressing FCN and then this key selects the Menu Mode (see page 30).

**6 -** Dials a "6" when entering a telephone number.

**7 (S. A/D) -** Dials a "7" when entering a telephone number. Pressing FCN and then this key changes the scan list status of the displayed system. The system is in the scan list and scanned normally if "S" is displayed when not scanning (see "Scan List Programming" on page 39).

**8 -** Dials an "8" when entering a telephone number.

**9 (G. A/D) -** Dials a "9" when entering a telephone number. With LTR-Net and LTR systems that are programmed for group scan, pressing the FCN switch then this key changes the scan list status of the displayed group. The group is in the scan list and scanned

normally if "G" is displayed when not system scanning (see "Scan List Programming" on page 39).

**0 ( ◄ ► ) -** Dials a "0" when entering a telephone number. When not in the phone mode, pressing FCN and then this key toggles between the numeric and alpha tag display modes (see page 19). When in the phone mode, pressing RCL and then this key momentarily displays digits that have scrolled out of the display. In the Menu Mode, pressing this key steps through the selectable functions.

✳ **-** Dials the DTMF "✳" character when entering a telephone number.

**# -** Dials the DTMF "#" character when dialing a telephone number. When in the phone mode and making an LTR-Net or LTR telephone call, pressing this key terminates the call (✳ # may also be used).

Alphanumeric Display
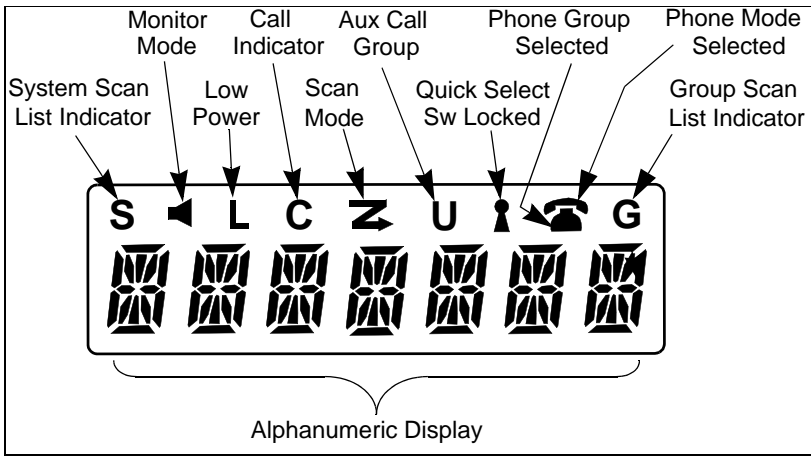
## Display

**Alphanumeric Display -** This seven-character area of the display indicates the selected system/group (see "System/Group Display Mode" on page 19), operating modes, and error conditions. In phone mode (telephone keypad models only), the telephone number is displayed in this area.

**S -** When not scanning, indicates that the displayed system is in the scan list and scanned normally (see "Scan List Programming" on page 39).

**G -** On LTR-Net and LTR systems only, indicates that the displayed group is in the scan list and scanned normally (see "Scan List Programming" on page 39).

◀ - Indicates that the conventional monitor mode has been enabled by the AUX switch on the side (see "Monitoring Before Transmitting" on page 46).

**L -** Indicates that the low-power mode is selected by the menu mode (see "Power Select" on page 35) or a low-battery condition (see page 30).

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**C** - Indicates that a call has been received on a system/group programmed for a call indicator (see page 28). Press any key to turn this indication off.

**Z** - Indicates that the scan mode is selected (see page 37).

**U** - Indicates that the displayed group is programmed for LTR-Net Auxiliary calls (either Unique ID or Directed Group). See page 44.

**▮** - Indicates that the current quick select switch position is locked. That position then cannot be user programmed, and the selected system/group cannot be changed by the SYS and GRP keys if applicable (see page 35).

**☎** - When the base portion is displayed, the selected group is programmed for LTR-Net or LTR telephone calls (see page 24). When the receiver portion is displayed, the phone mode is selected (see page 31).

# GENERAL OPERATION

### Backlight Operation

The display and keypad backlight automatically turns on for 3 seconds whenever any key is pressed or the quick select switch is rotated.

### System/Group Display Mode

Two system/group display modes can be selected. One is a numeric format and the other is an alpha tag format (see next paragraph). To switch between these modes, press ◄ ► (standard models) or FCN ◄ ► (telephone keypad models). The numeric mode is automatically selected when power is turned on and when the GRP key is pressed (keypad models). These modes operate as follows:

Numeric Mode **-** The system and group numbers are displayed as "Sxx Gxx" and the system alpha tag, if programmed, is not displayed. When only group scanning is occurring, the group number is replaced by dashes and the system number continues to be displayed (see "Group Scanning" on page 38).

Alpha Tag Mode - The system alpha tag is displayed and the system and group numbers are not displayed. There is no special group scan indication when only group scanning is occurring because the system alpha tag continues to be displayed.

## System and Group Select

Standard Model **-** The quick select switch is used to select up to 16 system/group combinations. The system/group selected by each position is preprogrammed by your system operator (positions are not user programmable). Systems and groups cannot be selected from the front panel with this model.

Telephone Keypad Model **-** Systems and groups can be selected by the quick select switch and the keypad SYS and GRP keys (except when the quick select switch position is locked). Pressing the SYS or GRP key increases the system or group, and pressing the FCN key before these keys decreases the system or group. If the key is held down, the function repeats. After the highest programmed system or group is selected, the lowest programmed system or group is displayed and vice versa. When the system is changed, the last selected group of that system is displayed.

## Setting Squelch and Volume Levels

This transceiver does not have a squelch control because the squelch level is preset. Therefore, no squelch adjustment is required. To enable a reference tone to determine the current volume setting, press any key and a tone sounds if the key press tone is enabled in the menu mode (see page 29). The index on the volume knob may also indicate the current volume setting.

## LTR-Net, LTR, and Conventional Operation

Introduction

Each selectable system can be programmed for LTR-Net, LTR, or conventional operation. The type of operation that is programmed is determined by the radio equipment being used by your system operator. There are only a few differences in operation that are of concern to the user. These differences are described in the following information and also noted elsewhere in this manual as required.

LTR-Net and LTR Operation

The LTR-Net and LTR modes provide automatic channel selection and monitoring before transmitting. Special tones and display messages indicate busy and out-of-range conditions, and telephone calls can be placed almost as conveniently as with your home telephone.

Selecting a system selects a collection of up to ten groups, and selecting one of these groups selects an ID code which determines the type of call (standard group, telephone, or special). In addition, with standard group calls, it determines the specific mobile or mobiles is being called and what calls are received. The system may also be programmed with fixed priority and blocks of ID codes that allow additional calls to be received (see page 43).

The LTR-Net operating mode provides the most operating features. Exclusive LTR-Net features include roaming and special calls such as Unique ID and Directed Group. Special Calls can be made to mobiles in your site or some other site. LTR-Net and LTR features are described starting on page 42.

Conventional Operation

In the conventional mode, selecting a system selects a collection of up to ten conventional radio channels, and selecting a group selects one of those channels and special Call Guard squelch coding

on that channel (if used). This coding determines the mobile or group of mobiles being called and also the mobiles from which calls are received (see "Call Guard Squelch" on page 48).

In the conventional mode, a busy condition is detected automatically if the Transmit Disable On Busy feature is used. Otherwise, it must be detected manually as described in "Monitoring Before Transmitting" on page 46. Busy and no access conditions cannot be detected with conventional signaling, so are not indicated by special tones or display messages. Refer to "Operation At Extended Range" on page 55 for information on how to determine if an out-of-range condition may exist.

# STANDARD GROUP CALLS

## Introduction

Most calls you make are probably the standard group type described in this section. These are calls between you and another mobile or control station. The main difference between these and other types is that no number is dialed to place the call. The following procedure can be used for all three types of operation (LTR-Net, LTR, and conventional).

## Placing a Standard Group Call

1.  Select the desired system and group using the quick select switch or keypad SYS and GRP keys (see "System and Group Select" on page 20).

2.  If a conventional system is selected, the channel must be monitored before transmitting. Refer to "Monitoring Before Transmitting" on page 46 for more information.

3.  Press (and hold) the push-to-talk switch to talk and release it to listen. Operation on LTR-Net, LTR, and conventional systems is as follows:

### LTR-Net and LTR Operation

• If the proceed tone is enabled, it sounds shortly after the PTT switch is pressed if the radio system is successfully accessed. If this tone is disabled, no tone sounds (see page 42).

• If all repeaters are busy, the busy tone sounds and "BUSY" is indicated in the display. The PTT switch must then be released and pressed again to make another access attempt.

• If the system could not be accessed because of an out-of-range condition or some other reason, the intercept tone sounds and "NO ACCS" is indicated in the display. The PTT switch must then be released and pressed again to make another access attempt (see "Operation At Extended Range" on page 55).

• When responding, busy or no access conditions may also occur as when placing a call because the system is accessed for each transmission.

### Conventional Operation

• If the channel is busy and the Transmit Disable On Busy feature is programmed (see page 47), the transmitter is disabled. While the PTT switch is pressed, monitoring is enabled so that the activity on the channel can be monitored.

• Otherwise, busy and no access conditions are not indicated and speaking can begin when the PTT switch is pressed (if the channel is not busy). The proceed tone does not sound with conventional operation.

4. When the call is finished, the transceiver automatically returns to the standby mode.

### Receiving a Standard Group Call

1. Select or scan the system and group on which the call is to be received.

2. When a message is received, press the push-to-talk switch and respond. If scanning, revert programming may affect the selected system/group when the PTT switch is pressed (see "Transmitting While Scanning" on page 41). When the call is finished, the transceiver automatically returns to the standby mode.

# TELEPHONE CALLS

### Introduction

*NOTE: Telephone calls can be placed and received only if that service is available to you and your transceiver has been programmed appropriately. In addition, the telephone keypad model of this transceiver is required to place these calls.*

The telephone calling feature allows telephone calls to be placed and received using your transceiver. The following information describes these calls on LTR-Net and LTR systems. If telephone calls can be placed on conventional systems, the procedure may be different.

### Placing a Telephone Call

1. Select the system and group programmed for telephone calls. When a group programmed for telephone calls is selected, the base portion ◢◣ of the telephone icon is displayed.

2. If you want to use the phone mode to place the call, select it by pressing FCN and then PHON or SND. This mode is indicated by the handset portion ◥◤ of the telephone symbol in the display. Refer to page 31 for more phone mode information.

3. To obtain a dial tone, briefly press the PTT switch. If the proceed tone is enabled, hold the PTT switch until this tone sounds. Busy and no access conditions may also be indicated as described for standard group calls on page 23.

4. If using the phone mode, transmit the telephone number in the display by pressing the SND key. If not using the phone mode, press the PTT switch and dial the number. If the digits are dialed too slowly, the call may be automatically terminated.

5. If applicable, release the PTT switch and when the party answers, press the PTT switch to talk and release it to listen as with standard group calls. Since the path is one way, you cannot hear the landside party while the PTT switch is pressed or talk to the landside party while it is released.

6. When the call is finished, it should be terminated by pressing the # key (or ✳ and then # in some applications). The PTT switch must be pressed to send these characters if the phone mode is not selected. The # character is also sent automatically when the phone mode is exited by pressing FCN PHON. Three beeps indicate that the call has been terminated. Terminating a call in this manner prevents additional billing that may occur while the system automatically detects the end of the call.

## Receiving a Telephone Call

1. With LTR systems, select or scan the system and group programmed for telephone calls. When a group programmed for telephone calls is selected, the base portion 📞 of the telephone icon is displayed. With LTR-Net systems, the telephone group does not need to be selected to receive telephone calls; however, it may need to be selected to respond.

2. When "ringing" is heard, press the PTT switch and respond. The PTT switch must be pressed to talk and released to listen as with standard calls.

3. When the call is complete, it should be terminated as in the preceding step 6.

## Landside-Originate Telephone Calls

If telephone calls can be placed, then it is usually possible to receive telephone calls from a landside telephone. With some radio systems, each mobile is assigned a unique telephone number so that it can be dialed directly. With others, the number of the radio system is dialed and then when a tone sounds, the number specifying the mobile being called is dialed using a tone-type telephone. The mobile user hears "ringing" when the call is received. Contact your system operator for the number to dial and more information on how to place these calls.

# LTR-NET AUXILIARY CALLS

## Introduction

The LTR-Net Auxiliary calls are Unique ID and Directed Group (see page 44). Unique ID calls are to specific mobiles, and Directed Group calls are to specific talk groups. These calls can be placed to mobiles in your site or some other site that is part of your radio network.

As with telephone calls, a special number must be dialed to place these calls. Therefore, the telephone keypad model of this transceiver is required. In addition, you must be authorized to place these calls and your transceiver must be programmed appropriately.

## Placing LTR-Net Auxiliary Calls

1. Select the LTR-Net system and group programmed for Auxiliary calls. When a group programmed for these calls is selected, "**U**" is indicated in the upper part of the display.

2. If you want to use the phone mode to place the call, select it by pressing FCN and then PHON (do not use SND because the phone system/group is then selected). This mode is indicated by the handset portion ⌐ of the telephone symbol in the display. Refer to page 31 for more phone mode information.

3. To obtain a dial tone, briefly press the PTT switch. If the proceed tone is enabled, hold the PTT switch until this tone sounds. Busy and no access conditions may also be indicated as described for standard group calls on page 23.

4. A 1-10 digit number is dialed which specifies the destination of the call. If you can place these calls, your system operator will provide the required numbers.

   If using the phone mode, transmit the number in the display by pressing the SND key. If not using the phone mode, press the PTT switch and dial the number. If the digits are dialed too slowly, the call may be automatically terminated.

5. A tone then sounds to indicate that the call was accepted by the system. If this tone does not sound, an unauthorized or incorrect number may have been dialed. The call then proceeds as follows. If all system resources are busy, the call is placed in a queue as described in "Busy Queuing" on page 44.

   **Unique ID Call -** Ringing is heard to indicate that the other trans-ceiver is being rung. If there is no answer, ringing automatically stops after several rings and the call is terminated. When the other party answers, respond as with a standard call.

   **Directed Group Call -** A second tone sounds to indicate that the path is complete and speaking should begin. No ringing occurs.

6. When the call is complete, it should be terminated by pressing the # key (or ✳ and then # in some applications) similar to phone calls. Refer to step 6 on page 25 for more information.

### Receiving Auxiliary Calls

To receive a Unique ID call, all that is required is that an LTR-Net system containing a group programmed for those calls be selected. To receive a Directed Group call, the group of the call must be selected or scanned. A Unique ID call is indicated by a "ringing" tone similar to telephone calls, and a Directed Group call is indicated by the caller's voice similar to standard group calls.

The transceiver may be programmed so that responses always occur on the last selected group. In this case, the group may need to be manually changed to respond to these calls (see "Transmitting While Scanning" on page 41). Unique ID and Directed Group calls can also be placed from a landside telephone. The same numbers are dialed as when the call is mobile originated. Contact your system operator for more information.

# GENERAL FEATURES

### Auxiliary Switch

This is the upper AUX switch on the side. On conventional systems, it enables the monitor mode so that the channel can be monitored (see page 46). On LTR-Net and LTR systems, it temporarily halts scanning and displays the selected system/group number or system alpha tag. On all systems, rapidly pressing it twice toggles group scanning on and off (see page 38).

### Call Indicator

The call indicator is "**C**" in the display, and its function is to show that a call was received while you were away from the transceiver. It can be programmed by your system operator to indicate calls on only certain groups, and is turned off by pressing any key. If scanning is enabled and the HOME key is programmed to display the last active system/group (see next description), pressing that key displays the system/group on which the last call was received.

### Home System/Group Select

Pressing FCN HOME (telephone keypad models only) temporarily displays either the preprogrammed home system/group or last active system/group. System operator programming determines which is displayed and also the length of time (1-7 seconds) it is displayed. This function is disabled if the quick select switch is turned to a locked position.

### Keypad Lock

Occasionally, the front-panel keys may be accidentally pressed. This could happen, for example, if you carry the transceiver on your belt and it brushes against other objects. To prevent this from happening, all front panel keys (except MENU) can be disabled by the keypad lock feature. To lock the keypad, select the menu mode by pressing FCN MENU and then press the ◀ ▶ key and PTT switch to select "KP_LOCK parameter (see page 30).

If a key is pressed with the keypad locked, all that happens is that "KP_LOCK" is indicated in the display. To re-enable the keys again, reselect the menu mode and "KP_ENAB" or "KP_MUTE". The top and side panel controls remain functional with this feature selected. Turning power off and then on again does not re-enable the keypad.

### Key Press Tone

A short tone normally sounds when a front panel key or the AUX and FCN switches on the side are pressed. If desired, this tone can be disabled by the menu mode "KP_MUTE" parameter. Press FCN MENU to select the menu mode and then press the ◀ ▶ key and PTT switch to select "KP_LOCK (see page 30). There is no indicator that shows that this tone is disabled. To re-enable the key press tone, reselect the menu mode and "KP_ENAB". Turning power off and then on again does not re-enable the key press tone.

## Low Battery Indicator

When the battery voltage drops to the point where recharging is required, the amber low-battery indicator on the top panel lights. In addition, a beep sounds when this indication initially appears and when the push-to-talk switch is released (if the key press tone is enabled). The battery should be recharged as soon as possible after this indication appears (see page 53).

The low-battery indication is turned off by turning power off and then on again. Current settings of switches and other parameters are saved in memory during a low-battery condition, and low transmit power is automatically selected (indicated by "**L**" in display). If the battery voltage drops to the point where the transceiver no longer operates, all segments in the display are enabled.

## Menu Mode

All models of this transceiver have a menu mode that can be used to select the following functions:

- Power output level (see page 35)
- Keypad lock (see page 29)
- Key press tone disable (see page 29)
- Disable proceed tone or set loudness (see page 42)
- Display operating software version number

To select functions using the menu mode, proceed as follows:

1. Press FCN MENU to select the menu mode. Calls are not received while this mode is enabled.

2. Press the ◀ ▶ key to display the various parameter groups. The currently selected parameter in each group is displayed. To select another parameter, press the PTT switch. The three groups and the parameters in each are as follows:

**HIPOWER -** High power
**LOPOWER -** Low power

**KP_LOCK -** Keypad disabled
**KP_ENAB -** Normal operation
**KP_MUTE -** Key press tone disabled

**PTT_0TN -** Proceed tone disabled
**PTT_1TN -** Single (standard) proceed tone
**PTT_2TN -** Dual (loud) proceed tone

**565220x -** Version number of the radio operating software.

3. To save the selected configuration and exit the menu mode, press FCN. This also occurs automatically if no key is pressed for 3 seconds.

For example, if you want to disable the keypad, select the menu mode and then press the ◄ ► key to select the "KP_xxxx" group. Press the PTT switch to display "KP_LOCK" and then press FCN (or wait 3 seconds) to select that configuration. Turning power off does not change any menu mode parameter.

## Phone Mode

Introduction

The phone mode allows a telephone number to be entered at any convenient rate, any dialing errors corrected, and then the number can be transmitted when desired. It also allows up to six numbers to be stored in memory and later recalled. This mode is available only with transceivers which have the telephone keypad.

While in the phone mode, the selected system/group can be changed only by the quick select switch because the SYS and GRP keys become RCL and CLR keys. Selection of the phone mode is optional when receiving a call because it does not enhance operation.

The phone mode functions are summarized below. Refer to the following sections for more information on these functions.

**Select/Exit Phone Mode -** FCN PHON
**Select Phone Mode and Phone Sys/Grp -** FCN SND
**Transmit No. in Display -** SND (with dial tone sounding)
**Erase Last Digit -** CLR
**Erase Entire No. -** RCL CLR
**Display Overflow Digits -** RCL ◀ ▶
**Store a Number -** FCN STR (1-6)
**Recall a Number -** RCL (1-6)
**Scroll through Memory -** RCL RCL

Entering and Exiting the Phone Mode

The phone mode is selected by pressing FCN PHON or FCN SND. A different system/group is selected as described below. The phone mode is indicated when the handset portion ☎ of the telephone symbol is displayed (the base ☎ indicates that a telephone group is selected). To exit the phone mode, press FCN PHON again (FCN SND cannot be used).

**PHON Key -** When the phone mode is selected by FCN PHON, the displayed system and group do not change when it is entered or exited. Use this key if placing special calls as described on page 26.

**SND Key -** When the phone mode is selected by FCN SND, the system/group preprogrammed for telephone calls is automatically selected. Then when the phone mode is exited, the last selected system/group is again displayed. If the quick select switch is in a locked position, this key does not select the phone mode.

Entering a Telephone Number

Numbers up to 14 digits in length can be entered in the phone mode. If a dialing error is made, the last digit can be erased by pressing CLR. Holding that key down causes the function to repeat. To erase the entire number in the display, press RCL CLR. Although

numbers up to 14 digits can be entered, only the last seven digits are displayed (the others scroll out of the display). To momentarily display the overflow digits, press RCL ◄ ► .

To automatically send the number in the display, momentarily press the PTT switch to acquire a dial tone and then press SND. If a conventional system is selected, the channel must be monitored in the normal manner as described on page 46.

The keypad remains active while a conversation is in progress to allow access to special services that require numbers to be dialed after connection is made. Simply press the PTT switch and dial the number. The number in the display does not change when a number is dialed in this manner. If you want to save the number in the display, make sure that it is stored as described next before the phone mode is exited. Numbers can also be recalled from memory as described below.

Storing a Number

In the phone mode, up to seven 14-digit numbers can be stored in memory and then later recalled. To store a number, enter the number as described in the preceding section. Then press FCN STR and the number of the desired location from 1-6. If there is already a number in the location, it is replaced by the new number. To clear a location, simply store a blank display.

If an invalid location number is entered or the location is locked by programming (see next section), an error tone sounds. The * character is stored and sent normally (no pause occurs). The # character should not be stored if it terminates the call.

Recalling A Number

To recall a number from memory, press RCL and the location number from 1-6 (with the phone mode selected). The number is then displayed and can be changed if desired. When numbers longer than seven digits are recalled, the left-most seven digits are

displayed for 2 seconds and then the right-most seven digits are displayed continuously. To momentarily redisplay the left-most digits, press RCL ◀ ▶ .

A number can also be recalled from memory after the connection is made and then dialed automatically by pressing SND. This operation allows, for example, a credit card number to be stored in memory and dialed automatically.

The RCL key can be used to scroll through the programmed numbers. Pressing this key twice within 2 seconds displays the number in location 1. The first press displays the upper seven characters and the second press displays the lower seven. Then pressing it again displays the number in location 2 in the same manner and so on. Empty locations are displayed as blank digits.

If there are more than seven digits in a location, the left-most digits are initially displayed. Pressing RCL while these digits are being indicated displays the right-most digits. If RCL is pressed only once, left-most digits are displayed for 2 seconds and then the right-most digits are displayed continuously.

## System Operator Programmed Numbers

Any of the six memory locations can also contain a pre-programmed telephone number. An alpha tag for the telephone number can then be stored in unused digit positions of each number. For example, if a number has seven digits, "RICHARD" could be stored with the number. Then when the number is recalled, "RICHARD" is flashed in the display followed by his telephone number.

Each system operator programmed position can be locked so that it cannot be reprogrammed by the user. If you attempt to program one of these locations, an error tone sounds. If you do change a system operator programmed number, the alpha tag is erased and can not be reprogrammed from the keypad.

Terminating Calls

When a telephone call (or LTR-Net auxiliary call) is finished, it should be terminated by pressing the # key (or ✳ and then # in some applications). This prevents additional billing that may occur for the time it takes the radio system to automatically detect the end of the call. If the phone mode is selected when the # or ✳ key is pressed, the PTT switch does not need to be pressed to transmit the character. The # character is sent automatically when the phone mode is exited by pressing FCN PHON.

## Power Select

This transceiver has selectable high and low power output. The low output level is indicated by "L" in the display. The menu mode selects the desired power level. Press FCN MENU to select the menu mode and then the ◀ ▶ key and PTT switch to select "LOPOWER" or "HIPOWER" (see "Menu Mode" on page 30). Turning power off and then on again does not change the selected power output level. Selecting low power may increase battery life and decrease range, and selecting high power may cause the opposite to occur.

## Quick Select Switch

General

The top panel quick select switch can select up to 16 system/ group combinations. If the quick select switch is turned while transmitting, the system/group does not change until the PTT switch is released. The system/group also does not change if the position has not been programmed. The differences in operation between standard and telephone keypad models are as follows:

Standard Models

With standard models (without telephone keypad), the quick select switch is always used to select system/groups because there

are no front panel SYS and GRP keys. Up to 16 preprogrammed combinations of 14 systems and 10 groups can be programmed. For example, position 1 may select System 1/Group 1, position 2 System 1/Group 2, position 3 System 2/Group 1, and so on. Switch positions are not user programmable with standard models.

Telephone Keypad Models

With telephone keypad models, both the quick select switch and the keypad SYS and GRP keys can be used to select system/groups. For example, the switch could be used as a "quick select" and the keys used for scrolling.

Each quick select switch position can be locked by system operator programming. When a locked position is selected, the SYS and GRP keys are disabled. This ensures that the system/group programmed for that position is always selected. This is useful when the display cannot be easily viewed, such as when the transceiver is carried on a belt. A locked position is indicated by 🔒 in the display.

If a position is not locked by programming, the system/group selected by that position can be changed as follows:

1.  Set the quick select switch to the position to be programmed.

2.  Select the system/group for that position by pressing the SYS and GRP keys. If these keys do not function, the switch position or keypad is probably locked.

3.  To program the position with that system/group, press FCN STR. If "LOCKED" is displayed and a beep sounds, the switch position is locked by system operator programming and cannot be reprogrammed.

Operation With a Locked Position Selected (All Models)

LTR-Net roaming (see page 45) is not disabled when a locked position is selected ( 🔒 indicated in display). Therefore, if roaming

to another site occurs, the displayed system can change even if the position is locked. When scanning with a locked position selected, the "Last Selected" configuration described on page 41 is always selected. If this did not occur, a transmission could occur on a system/group other than the one selected. This affects operation only if the PTT switch is pressed to respond to a call with scanning halted.

Messages are still received normally on other system/groups when scanning or if a call is received on a priority or block ID code (see page 43). The transceiver stays on another system/group only until the PTT switch is pressed, the call is complete, scanning resumes, or another system/group is manually selected.

### Time-Out Timer

This feature disables the transmitter if it is keyed continuously for longer than the programmed time. It is programmed in half-minute increments from 0.5-5 minutes. If the transmitter is keyed continuously for longer than the programmed time, the transmitter is disabled, the intercept tone sounds, and "TX TIME" appears in the display. The timer and tone are reset by releasing the push-to-talk switch. The Time-Out Timer can prevent a blocked channel caused by an accidentally keyed transmitter. It can also prevent possible transmitter damage caused by transmitting for an extended period.

# SYSTEM AND GROUP SCANNING

## System Scanning

The system scan feature monitors the systems in the scan list for calls. It is turned on and off by pressing SCAN (telephone keypad models) or FCN SCAN (standard models). When system scanning is enabled, ⚡ is indicated in the display. When scanning

is actually occurring with an LTR or conventional system selected, the alphanumeric display indicates "IN SCAN" (the system/group number or alpha tag are not displayed). Scanning is sequential through programmed systems unless they have been deleted as described on page 39. If system scanning is not enabled, calls are detected on only the selected system.

## Group Scanning

Group scanning is available on LTR-Net and LTR systems only. It is enabled on those systems by system operator programming only. When one of those systems is selected or scanned, group scanning is automatically enabled. System scanning does not need to be enabled for it to occur.

If the numeric display mode is selected (see page 19) and system scanning is not occurring, group scanning is indicated by dashes in place of a group number (G - - ). Otherwise, it is not indicated. Group scanning can be turned on and off by quickly pressing the AUX switch on the side twice. The default group scanning mode for the system is reselected whenever transceiver power is turned on.

When group scanning is enabled on a system, calls are received on all selectable groups. Conversely, if it is disabled, calls are received on only the selected group (or last selected group if also system scanning). Group scanning is not available on conventional systems, so calls on those systems are always received on only the last selected group.

## Other Scanning Information

### General

When an incoming call is detected in the scan mode that the transceiver is programmed to receive, scanning stops and the message is received. The display changes to the system and group number or system alpha tag of the call. Shortly after the message is complete, scanning resumes.

The selected system or group can be changed while scanning by simply turning the quick select switch or pressing the SYS or GRP key (if available). The display mode can also be changed by pressing the ◀ ▶ key (see page 19). Pressing the AUX switch on the side temporarily halts scanning and displays the currently selected system/group.

LTR-Net Scanning

System scanning is not available on LTR-Net systems. There-fore, when an LTR-Net system is selected, calls are detected on only that system. Other LTR-Net, LTR, and conventional systems are not scanned even if scanning is enabled. If group scanning is programmed on an LTR-Net system as described earlier and the transceiver has the telephone keypad, the group scan list is user programmable (see "Scan List Programming" which follows).

LTR Scanning

If an LTR system is selected, all LTR and conventional systems in the scan list are scanned. Any LTR-Net systems are skipped in the scan sequence.

Conventional Scanning

If a conventional system is selected, all conventional and LTR systems in the scan list are scanned. Any LTR-Net systems are skipped in the scan sequence. Calls are always detected on only the last selected group of conventional systems because group scanning is not available.

## Scan List Programming

System Scan List

The system scan list contains the systems that are scanned by the system scan feature. It is user programmable with both standard and telephone keypad models. However, only LTR and conven-

tional systems can be added or deleted because system scanning is not available with LTR-Net systems as just described.

Group Scan List

The group scan list is programmable on LTR-Net and LTR systems which have group scanning enabled if using the telephone keypad model of the transceiver. The groups in each system that are scanned can be selected as described below. The group scan list is not programmable with conventional systems because group scanning is not available.

Scan List Programming

To change the scan list status of the displayed system, press FCN A/D (standard models) or FCN S.A/D (keypad models). Likewise, to change the scan list status of the displayed group (LTR-Net/ LTR systems and keypad models only), press FCN G.A/D. If group scanning is not enabled or group scan list programming is not permitted, an error tone sounds. To add all systems or groups back into the scan list, press and hold the scan list programming key for 2 seconds.

The scan list indicators are "S" and "G" in the display when scanning is not enabled. When "S" is displayed, the system is in the scan list and scanned normally. Likewise, when "G" is displayed, the displayed group is in the scan list and scanned normally. When scanning is enabled ( ⚡ displayed), "S" and "G" are not displayed.

Deleting a system assigned to one quick select switch position also deletes other positions programmed with groups from that system. For example, if positions 1, 2, and 3 are programmed with groups 1, 2, and 3 of System 1, deleting position 1 also deletes positions 2 and 3 because they are programmed with the same system.

A system or group can be deleted while listening to a message by simply pressing the programming key. Scanning resumes when the delay period expires (see "Scan Resume Delay" on page 42).

The current scan lists are stored in memory; therefore, the scan lists do not change when power is turned off. If the last system or group is deleted, an error tone sounds. If the last system is deleted, all systems are automatically added back into the scan list.

## Transmitting While Scanning

When a message is transmitted while system or group scanning is occurring, the transmission occurs on the currently selected system/group (the system/group displayed when scanning is turned off). However, if you respond to a call while scanning, the response occurs on either the selected system/group or the system/group of the call, depending on programming. The three available configurations are as follows:

Last Selected - The transceiver always transmits on the selected system/group, even when responding to a call. For example, assume System 1, Group 2 was displayed when scanning was enabled. If a call is then received on System 3/Group 4, that system/group is displayed. If the PTT switch is pressed to make a response, it occurs on System 1/Group 2. Therefore, to respond to the call, the system/group may have to be manually changed using the quick select switch or SYS and GRP keys (if applicable). The system/group of the call can also be made the selected system/group by turning off scanning before it resumes.

Temporary - If a response is made before scanning resumes ("IN SCAN" or group number dashes again displayed), the transmission occurs on the system/group of a call. If it is made after scanning resumes, it occurs on the selected system/group which may not be the same as that of the call. If this configuration was programmed for the preceding example, a response occurs on System 3/Group 4 if it is made before scanning resumes. If it is made after scanning resumes, it occurs on System 1/Group 2.

Last Received - The selected system/group changes to the system/group of a call. Therefore, you can always respond to a call without having to manually change the system/group.

*NOTE: If the current quick select switch position switch is locked (see "Quick Select Switch" on page 35), the transmission always occurs on the selected system/group even if the "Temporary" or "Last Received" configuration is programmed.*

## Scan Resume Delay

After a message is received or transmitted in the scan mode, there is a delay before scanning resumes. When a message is received, this delay prevents another message from being received before a response can be made. When a message is transmitted, this delay ensures that you hear a response to your message instead of some other message occurring on another system or group.

# LTR-NET AND LTR FEATURES

## Proceed Tone

The proceed (clear-to-talk) tone is a short tone that sounds when transmitting a message on an LTR-Net or LTR system. It indicates that the system has been successfully accessed and speaking can begin. This tone can be disabled or a standard or loud tone selected by the menu mode (see page 30). The proceed tone is not available on conventional systems.

If the radio system is busy when the PTT switch is pressed, the busy tone sounds instead of the proceed tone and "BUSY" is displayed. If the radio system cannot be accessed because of an out-of-range condition or some other reason, the intercept tone sounds instead of the proceed tone and "NO ACCS" is displayed. With both of these conditions, the PTT switch must be released to make another call attempt.

## Transmit Inhibit

This feature prevents the transmitter from keying if the mobile you are calling is busy with another call. If the PTT switch is pressed and the mobile you are calling is busy, the transmitter is disabled, the intercept tone sounds, and "TX INHIB" is displayed. To make another call attempt, the PTT switch must be released. However, you should wait a few seconds before pressing the PTT switch again because a timer must time out before another call will be successful. This feature can be enabled on some or all LTR-Net and LTR calls by programming. A similar Transmit Disable On Busy feature is available on conventional systems.

## Calls On Priority and Block ID Codes

Fixed priority and block ID codes may be programmed on LTR-Net and LTR systems in addition to the selectable group ID codes. Calls on these ID codes are received regardless of which group is selected or group scanning (all that is required is that the system programmed with these codes be selected or scanned).

When a call is detected on a priority ID code, the selectable groups are checked to see if any have the same ID code. If a match is found, the transceiver displays that group. If no match is found, the group number does not change and "RXPRI1" (or 2) is displayed. The programming described on page 41 determines if a change to another group is temporary or permanent. When a call is received on a block ID code, "BLK" is displayed in place of the group number and the group number does not change.
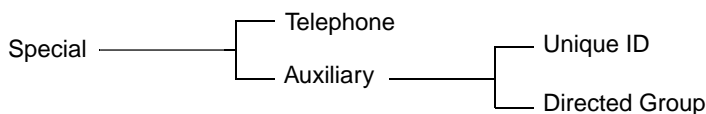
In addition, standard group calls received on LTR-Net and LTR systems have a priority order. If a call is detected that has a higher priority than the one being received, the transceiver immediately switches to the higher priority call. Telephone and special calls are not interrupted by priority calls.

# LTR-NET FEATURES

*NOTE: Other LTR-Net features are described starting on page 42.*

## LTR-Net Standard and Special Calls

     A breakdown of LTR-Net Special calls is shown below. Refer to the descriptions which follow for more information.

```
                        ┌── Telephone
                        │                    ┌── Unique ID
Special ────────────────┤                    │
                        └── Auxiliary ───────┤
                                             └── Directed Group
```

<u>Standard Group Calls</u> - These calls are made between mobile units and are probably the most common type. They are described starting on page 22.

<u>Telephone Calls</u> - These calls allow you to make telephone calls using your transceiver. They are described starting on page 24.

<u>Auxiliary Calls</u> - As shown above, Auxiliary calls include Unique ID and Directed Group calls. Unique ID calls allow calls to be placed to specific mobiles, and Directed Group calls allow calls to be placed to talk groups that have not been programmed in your radio. Auxiliary calls are described starting on page 26.

## Busy Queuing

     Queuing may be provided by the system for the special calls described in the preceding section if system resources are not available for the call. Standard group calls are not queued. When a call is placed in a queue, a voice message informs you that this has occurred. When resources then become available, the call is automatically placed and the normal ringing or other tones are heard if applicable. If the call cannot be placed in the allotted time, it is terminated and another message informs you that this has occurred.

### Roaming

LTR-Net radio sites can be linked together to provide wide area coverage. Then as you travel from site to site, calls are automatically routed to your current location. Both standard group and special calls may be routed to other sites. Roaming is automatically enabled if it is available whenever an LTR-Net system is selected (scanning does not need to be enabled). Roaming is not available when LTR or conventional systems are selected. Operation is as follows:

1. When transceiver power is turned on or if the signal from the current site becomes weak, the transceiver automatically begins searching for another LTR-Net site. When searching is occurring, "LC SRCH" is displayed.

2. When a new site is located, registration occurs and "LC SRCH" is no longer displayed. The displayed system is then the next LTR-Net system programmed for a site that could be accessed, and the displayed group is the last selected group in that system.

# LTR FEATURES

*NOTE: Other LTR features are described starting on page 42.*

### Group Calls

LTR and LTR-Net group calls are very similar and are described starting on page 22.

### Telephone Calls

LTR and LTR-Net telephone calls are placed in a similar manner and are described starting on page 24.

# CONVENTIONAL FEATURES

## Monitoring Before Transmitting

General

Government regulations require that the channel be monitored before transmitting to make sure that it is not being used by someone else. If you were to transmit while someone else is talking, you would probably disrupt their conversation. In the LTR-Net and LTR modes, channel monitoring is performed automatically when the call is placed. In the conventional mode, it may be performed automatically or manually as follows:

Automatic Channel Monitoring

If the Transmit Disable On Busy feature is programmed, monitoring is performed automatically. Refer to the description of this feature which follows for more information.

Busy Indicator

If the preceding feature is not programmed, the group must be monitored manually. The simplest way to do this is to note if the green Busy indicator on the top panel is on or off (scanning should be off and the desired group selected). If this indicator is off, the channel is not being used and you can transmit your message.

Monitor Mode

There may be times when the Busy indicator is on even though no one is using the channel. Monitoring should then be performed using the monitor mode. This mode is toggled on and off by pressing the AUX (upper) switch on the side, and it is indicated by ◀ in the display. The monitor mode disables Call Guard squelch (see page 48) and scanning so that all messages on the channel are heard. If no messages are heard with the monitor mode enabled, you can transmit you message.

## Transmit Disable On Busy

This feature automatically disables the transmitter if the group (channel) is busy when the PTT switch is pressed and the correct Call Guard code could not be detected (see page 48). If the correct Call Guard code is detected, the transmitter keys even if the group is busy (Busy indicator on). The transmitter also keys when the group is busy if the monitor mode just described is enabled or if this feature is not programmed.

When the transmitter is disabled by the Transmit Disable On Busy feature, the monitor mode is enabled for as long as the PTT switch is pressed. This allows any activity on the channel to be monitored. Occasionally, a busy condition may be detected even though no one is talking. To key the transmitter in this case, release the PTT switch and then press it again within 1 second.

## Receive-Only Groups

Conventional groups can be programmed for monitoring only (transmitting is not permitted). If the PTT switch is pressed with one of these groups selected, the transmitter does not key, the intercept tone sounds, and "TX DSBL" is displayed.

## Talk-Around Groups

Normally, all calls go through a repeater which usually increases range because the repeater transmits at a higher power level and has a higher antenna. However, if you are out of radio range of the repeater, you cannot talk to anyone, even though the mobile being called may be only a short distance away.

To allow communication if this occurs, talk-around groups (channels) can be programmed. These groups allow you to talk directly to another mobile without going through a repeater. If talk-around groups have been programmed, your system operator will provide you with more information on which ones they are and

when they should be selected. Talk-around is not available on LTR-Net and LTR systems.

### Call Guard Squelch

The Call Guard squelch feature can be programmed on any conventional group by your system operator. This feature eliminates distracting messages intended for others that may also be using the channel by using a subaudible tone or digital code to control the squelch. This tone or code is unique to you or your group on the channel. LTR-Net and LTR systems use ID codes to perform a similar function.

# MISCELLANEOUS

### Supervisory Tones

The following tones may be heard at various times when operating this transceiver:

Busy Tone

This tone is similar to the standard telephone busy tone, and it sounds when the radio system is busy when the PTT switch is pressed. This display also indicates "BUSY" when this condition occurs. Once a busy condition is indicated, no more access attempts are made until the PTT switch is released and then pressed again. This tone sounds only with LTR-Net and LTR operation.

Intercept Tone

This is a siren-like tone (alternating high and low tones) which indicates the following conditions:

- No Access - If this tone sounds after the PTT switch is pressed and "NO ACCS" is displayed, the radio system could not be accessed, perhaps because of an out-of-range condition. Refer to "Operation At Extended Range" on page 55 for more information. Once this

tone sounds, no more access attempts are made until the PTT switch is released and pressed again. This condition is indicated only with LTR-Net and LTR operation.

- Time-Out Timer - If this tone sounds after the transmitter has been keyed for an extended period and "TX TIME" is displayed, the transmitter has been disabled by the Time-Out Timer feature (see page 37).

- Receive-Only Group - If this tone sounds as soon as the PTT switch is pressed and "TX DSBL" is displayed, a receive-only conventional group is selected (see page 47).

Proceed Tone

This is a short tone that sounds on LTR-Net and LTR systems to indicate that the system has been successfully accessed and speaking can begin (see page 42).

Key Press Tone

This is a short tone that sounds to indicate that a key has been pressed. It can be disabled if desired by selecting "KP_MUTE" in the menu mode (see page 30).

Low-Battery Tone

This is a short tone that sounds when the battery needs recharging (see "Low Battery Indicator" on page 30).

## LTR-Net Special Call Tones

The following tones are generated by the LTR-Net equipment and are heard when making telephone, unique ID, or directed group special calls on a LTR-Net system.

Confirmation Tone - This is a short tone that sounds when the number just dialed has been accepted by the system.

Call Proceed Tone - With LTR-Net Directed Group calls (see page 26), ringing does not occur after the number is dialed. Instead, another short tone sounds after the confirmation tone to indicate that the audio path is complete and speaking can begin.

End Call Tone - Three beeps which indicate that the end of the call has been detected by the system.

Proceed Dialing Tone - When placing a landside-to-mobile telephone call (see page 26), the landside caller may enter a special number which specifies the mobile being called. This tone indicates when that number should be dialed.

## LTR Telephone Call Tones

The following tones are generated by the LTR interconnect equipment and are heard when making telephone calls on an LTR system.

Reorder Tone - Three beeps which indicate that the call has been terminated by the system.

Return Time Warning Tone - Two beeps which warn that you have not transmitted for an extended period. If you do not transmit within 5 seconds, the call is automatically terminated by the system. The time between transmissions is one of the parameters used by the system to detect the end of a call when the # character is not sent.

Conversation Time-Out Tone - Calls are limited to a certain length by the system. Thirty seconds before this time is reached, a "tick" begins sounding each second. When the 30-second time expires, the call is automatically terminated by the system.

Turn-Around Tone - This is a single beep which may be used to indicate to the landside party when to respond to your transmission. It sounds when you release the PTT switch, and you may partially hear this tone.

Proceed Tone - This tone consists of two beeps and it tells the landside caller when to enter the five-digit number specifying the mobile being called. Dialing of this number must be started within 5 seconds of hearing this tone, and a tone-type telephone must be used.

## Display Messages

The following messages appear in the display to indicate operating modes and error conditions.

**ALL Segments On -** All icons and all segments in the alphanumeric display can be enabled by turning power on with the FCN key pressed.

**BUSY -** Indicates that the radio system is busy when an LTR-Net or LTR system is selected.

**CALLSVC -** The transceiver is inoperative and must be returned to your system operator for reprogramming.

**FCN -** Indicates that the alternate function of the front panel keys has been enabled by the FCN switch on the side.

**IN SCAN -** Indicates that system scanning is occurring when an LTR or conventional system is selected (see "System Scanning" on page 37).

**KP_LOCK -** Indicates that the keypad has been locked by the menu mode (see "Keypad Lock" on page 29).

**LOCKED -** When programming a quick select switch position, indicates that the position is locked (see "Quick Select Switch" on page 35).

**Menu Mode Messages -** The following messages are displayed when the menu mode described on page 30 is selected:

**HIPOWER -** High power selected (see page 35
**LOPOWER -** Low power

**KP_LOCK -** Keypad disabled (see page 29)
**KP_ENAB -** Normal operation
**KP_MUTE -** Key press tone disabled (see page 29)

**PTT_0TN -** Proceed tone disabled (see page 42)
**PTT_1TN -** Single (soft) proceed tone
**PTT_2TN -** Dual (loud) proceed tone

**NO ACCS -** Indicates that the repeater system could not be accessed in the LTR-Net or LTR mode. Refer to intercept tone description on page 48 for more information.

**PRG CH -** Indicates that an over-the-air update of site channels is in progress. This does not affect user operation.

**RX PRI1 -** Indicates that a call has been received on an LTR-Net or LTR first priority ID code (see page 43).

**RX PRI2 -** Same as above except a second priority ID code.

**SLEEPNG -** Indicates that your transceiver has been temporarily disabled by the system operator. It will be automatically enabled again when operation can be resumed.

**SYN ERR -** Indicates that the frequency synthesizer is out of lock (see "Transceiver Service" on page 55).

**TX DSBL -** Indicates that a receive-only channel is selected in the conventional mode, so transmitting is not allowed (see page 47).

**TXINHIB -** Indicates that the selected group has been detected as busy by the LTR-Net or LTR transmit inhibit feature (see page 43).

**TXTIME -** Indicates the transmitter has been disabled by the Time-Out Timer (see page 37).

## System Operator Programming

As noted in the descriptions of many features in this manual, programming determines the availability and specific operation of the feature. This programming is performed by your system operator. There are no user programmable features with the standard model. With the keypad model, only the quick select switch positions, menu functions, and six telephone number locations may be user programmed. If you require additional information on the availability or operation of a feature, contact your system operator.

## Rechargeable Battery Pack

### *WARNING*

*Do not dispose of the battery pack in fire because it may explode. These nickel metal-hydride (NiMH) battery packs must be disposed of in accordance with local regulations. Do not short the terminals because the battery may become very hot.*

Battery Life

With proper care, the nickel metal-hydride (NiMH) battery pack used by this transceiver should provide excellent service. When the pack no longer holds a charge or provides only a very short operating time, it must be replaced with a new unit.

Typical operating time before recharging is required is 8 hours. This assumes that the transceiver is transmitting at high power 5% of the time, receiving and producing audio 5% of the time, and in the standby mode (receive with audio muted) 90% of the time. If the low-power mode is selected or different times are spent in these modes, operating time varies accordingly. The charge of the battery and ambient temperature also affect operating time.

*NOTE: Be sure to turn transceiver power off before removing the battery pack. Failure to do so may result in current settings not being saved in memory.*

Recharging

Recharging is required when the amber low-battery indicator on the top panel lights. In addition, a tone sounds when the indicator initially lights and then whenever the PTT switch is released (if the key press tones are enabled). Refer to "Low Battery Indicator" on page 30 for more information.

The pack can be recharged while still on the transceiver or it can be charged separately. To remove the battery pack from the transceiver, press the spring-loaded release button on the side upward and slide the battery off. A new battery pack must be charged before use.

Battery Care

One cause of shortened battery life is repeated deep discharge. Therefore, it is recommended that the battery be recharged as soon as practical after the low-battery indication appears (see preceding information). Do not continue using the transceiver until the battery is completely discharged. Another cause of reduced battery life is operation at temperature extremes. It is also good practice not to regularly leave a pack in the charger for extended periods after it is completely charged.

It is possible that the pack could develop a characteristic called "memory" although these packs are designed to minimize that problem. When a pack has this problem, it acts as if it is totally discharged even though it has greater capacity. This can be caused by discharging a pack only slightly before recharging, charging at too high a temperature, or extended storage. If a pack develops this problem, it can usually be corrected by performing three discharge/ charge cycles.

## Speaking Into Microphone

For best results, hold the speaker grille about 1-2 inches from you mouth and speak at a normal conversational level. Do not shout

since it distorts you voice and does not increase range. Make sure that the PTT (push-to-talk) switch is pressed before you begin to speak and released as soon as the message is complete.

### Operation At Extended Range

When approaching the limits of radio range, the other party may not be able to hear your transmissions and there may be an increase in background noise when messages are received.

Even though you can hear messages, you may still be out of radio range. The reason for this is that the signal being received is normally transmitted by a repeater which usually has a much higher power level than is produced by your transmitter. Communication may be improved by moving to higher ground or away from shielding objects such as tall buildings or hills.

### Licensing

A government license is usually required to operate this transceiver on the air. Your system operator will normally handle the licensing requirements.

### Transceiver Service

If your transceiver is not operating properly, "SYN ERR", "PRG ERR", "SLEEPNG", or "CALLSVC" may be displayed (see "Display Messages" on page 51). To attempt to clear the first two messages, turn power off and then on again to reset the control logic. Otherwise, make sure that the battery is charged, the controls properly set, and the antenna is tight and not damaged. If the transceiver still does not operate properly, take it to your system operator for service.

*NOTE: There are no user-serviceable components in the transceiver. Altering internal adjustments can cause illegal emissions and void the warranty, and result in improper operation that can seriously damage the transceiver.*

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